REMARKS

The claims have been amended to more clearly state that which applicants believe to be their invention. More particularly, claim 15 has been amended to clarify that the kinase is a recombinant *Drosophila melanogaster* kinase. Furthermore, claims 16 and 22 have been amended to specify one of the distinguishing characteristics of the claimed recombinant kinase. Support for the amendment to claims 16 and 22 is found in Example 7, the first full paragraph. New claims 27-29 have been added to claim further embodiments of the invention. Support for claim 29 is found in the original claims and Examples 2-7.

The title of the application and the abstract have been amended to address the Examiners objections. These amendments are believed to be fully responsive to the Examiner's objections to the title and abstract.

The Examiner has also objected to the structures as drawn on page 1 of the specification, contending that the "ribose sugar is drawn as if there is (sic) four methyl substitution instead of hydrogen." Applicants respectfully submit there is nothing wrong with the Haworth projection designation of the ribose rings as drawn. Furthermore, one of ordinary skill would recognize these drawings as correct representations of the designated nucleosides. In support of applicants' position, attached is a page (labeled "Exhibit A") from an organic chemistry textbook ("Carbohydrates and Nucleic Acids" in G. Marc Loudon, Organic Chemistry, The Benjamin/Cummings Publishing Company, Inc, page 1206 (1988)) describing what the structures of a Haworth projection represent. As noted, "bonds with nothing on the ends bear hydrogen atoms." Accordingly, applicants respectfully request the withdrawal of the Examiner's objection s to the drawn structures.

The Examiner has requested the listing of the author for the reference listed on line b) of page 9. Applicants have amended the specification to include that information.

The amended specification is believed to be free of any defects and applicants respectfully request the withdrawal of the objections to the specification.

Claims 15-26 stand rejected as failing to comply with the written description requirement of 35 USC § 112, first paragraph. Applicants respectfully traverse this rejection.

The Examiner contends that the claims cover any nonvertebrate kinase that uses all natural deoxynucleosides as a substrate. Applicants respectfully submit that the claims state that the coding sequence of the kinase gene was taken from *Drosophila melanogster*. Therefore, the resulting kinase produced by the method of claim 15 was limited to a recombinant *Drosophila melanogster* kinase. To clarify that applicants are claiming a recombinant *Drosophila melanogster* kinase, the preambles of claims 15 and 22 have been amended to specifically state the kinase is a *Drosophila melanogster* kinase. Accordingly, applicants respectfully submit that the scope of the claims is commensurate with the disclosure provided by applicants. Withdrawal of the rejection of claims 15-26 under 35 USC § 112, first paragraph for failure to comply with the written description is respectfully requested.

Claims 15-26 stand rejected under 35 USC § 112, first paragraph for lack of enablement. Applicants respectfully traverse this rejection.

As noted above the claims have been amended to further clarify that applicants claim is directed to a recombinant *Drosophila melanogster* kinase. As noted by the Examiner, applicants have enabled Dm-dNK, and the claims have been amended to clarify that is what the claims are encompassing. Accordingly, withdrawal of the rejection of claims 15-26 under 35 USC § 112, first paragraph for lack of enablement is respectfully requested.

Claims 15-26 stand rejected under 35 USC § 102(b) as being anticipated by Munch-Petersen et al., (1998) as evidenced by Johansson et al., (1999). Applicants respectfully traverse this rejection.

Munch-Petersen et al. disclose the isolation and characterization of a *Drosophila melanogster* kinase. The kinase was isolated from a *Drosophila melanogster* embryonic cell line (S-2 cell line) in its native form. The S-2 cell line has not been altered by any recombinant DNA technology and the native *Drosophila melanogster* kinase was purified in the absence of any cloning steps. Contrary to the Examiner's assertions, the cell line disclosed by Munch-Petersen, and the kinase purified therefrom cannot be considered to be "recombinant" as that term is commonly understood. "A recombinant protein is a protein produced by an organism after the relevant DNA is inserted into its genome (that is, by a genetically modified organism). This recombines the DNA of two different organisms." (Wikipedia encyclopedia, internet). Webster's online dictionary defines recombinant as "relating to or containing genetically engineered DNA". Accordingly, even though applicants have not provided a specific definition for the term "recombinant", even the broadest reasonable interpretation of that term would not encompass a kinase that was expressed under the control of its native regulatory sequences as is the case with the kinase disclosed by Munch-Petersen et al. Thus the kinase disclosed by Munch-Petersen does not meet all the limitations of claims 15-26.

The Examiner further states that since the amino acid sequence of the presently claimed kinase is the same as the kinase disclosed by Munch-Petersen et al., both kinases would share the same inherent physical properties. Surprisingly, applicants have found that is not the case, supporting applicants' position that the recombinantly produced kinase is distinct from the purified kinase described by Munch-Petersen et al. In particular, applicants direct the Examiner's attention to Example 7 and the accompanying data presented in Fig. 7. As shown in Fig. 7 the recombinant kinase has substantially improved stability relative to purified native kinase, retaining close to 100% of its activity after incubation in a 50 mM Tris pH 7.5 and 2.5 mM $MgCl_2$ solution at 37°C for up to 50 minutes. The activity of the native kinase begins to drop off almost immediately, have less than half its activity after only 15 minutes. Accordingly, although the primary amino acid sequence is the same between the two kinases, obviously, there must be some other structural differences between these two kinases that produces this difference in properties. Accordingly, the purified native kinase of Munch-Petersen et al. fails to anticipate the highly stable recombinant kinase of the present invention.

Accordingly, applicants believe the invention of claims 15-26 is not anticipated by Munch-Petersen et al., (1998) as evidenced by Johansson et al., (1999) and respectfully request the withdrawal of the rejected under 35 USC § 102(b) based on those references.

Claims 15-26 stand rejected under 35 USC § 102(b) as being anticipated by Johansson et al. As noted by the Examiner this rejection can be overcome by providing a certified English translation of German application 198 46 838.5 and indicating support for the instant claim limitations. Transmitted herewith is a certified English translation of German application 198 46 838.5. Support for the invention as claimed is found on page 17, Example 6 and in Fig. 7A of that document. The data presented in the priority document demonstrates the superior stability of the recombinant kinase relative to native kinase in the absence of BSA (a stabilizing protein). Accordingly, applicants respectfully submit that the invention as claimed is entitle to the priority date of October 12, 1998 and therefore Johansson et al. is not prior art to the claimed invention.

Claims 15-26 stand rejected under 35 USC § 102(b) as being anticipated by or in the alternative as be obvious over Munch-Petersen et al and Johansson et al. Applicants respectfully traverse this rejection.

The Examiner has noted that claims 15-26 will be construed as product by process claims and that patentability will be determined based on the product itself. As noted above the recombinantly produced proteins has properties distinct from that of the native protein. Furthermore, as noted by the Examiner, the fact that the two kinases do have such distinct properties is surprising, and this unexpected property supports the patentability of applicants' novel deoxynucleoside kinase. The mere fact that one may be motivated to recombinantly express a protein in an effort to enhance the production represent an obvious to try standard of patentability which is not the proper standard for determining the patentability of inventions.

Applicants have submitted herewith a certified English translation of German application 198 46 838.5 which fully supports the claimed invention. Accordingly, the Johansson et al reference is not a proper prior art reference. In the absence of that reference there is simply no guidance as to which expression system or host cells should be used even if one was motivated to recombinantly express the *Drosophila melanogaster* kinase. Applicants respectfully submit a generalized desire to produce proteins recombinantly fails to provide sufficient motivation or guidance to do what applicants have done and now claim as their invention. In particular, applicants note that *In re Deue*l held that "a claim to a specific DNA [compound] is not made obvious by mere knowledge of a desired protein sequence and methods for generating the DNA that encodes that protein." (51 F.3d 1552, 1558 (1995). In *Deue*l there is an admission by the panel that that there is a "[a] general motivation to search for [the] gene[,]" (*id*), yet this falls short of what is necessary to establish obviousness. (See also *In re Bell*, 991 F.2d 781, 783-84 (Fed. Cir. 1993)). Accordingly applicants respectfully submit a general motivation to clone and recombinantly express a gene similarly falls short of establishing obviousness of the present recombinant protein that demonstrates unexpected stability.

Furthermore, there is nothing in Munch-Petersen to direct one of ordinary skill to produce the *Drosophila melanogaster* kinase in the manner applicants have, which led to the production of a kinase having unexpected properties. Accordingly, the claimed invention is believed to be nonobvious over the cited reference.

The foregoing claim amendments and remarks are believed to fully respond to the Examiner's rejections and the claims are believed to be in condition for allowance. Applicants respectfully request allowance of the claims, and passage of the application to issuance. If any further discussion of this matter would speed prosecution of this application, the Examiner is invited to call the undersigned at (434) 220-2866.

Respectfully submitted,

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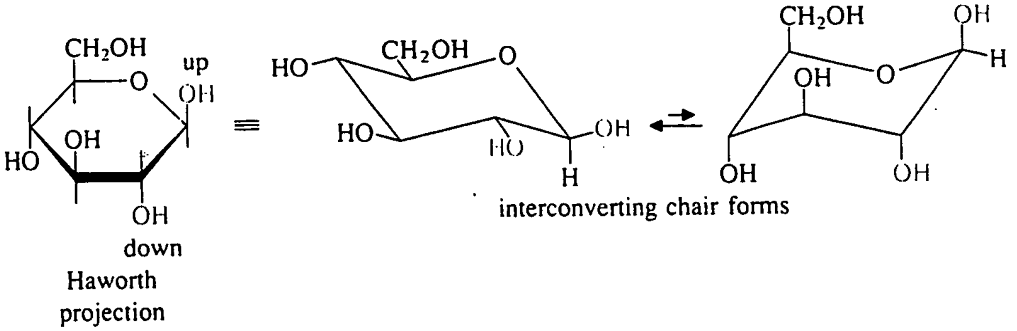
Exhibit A

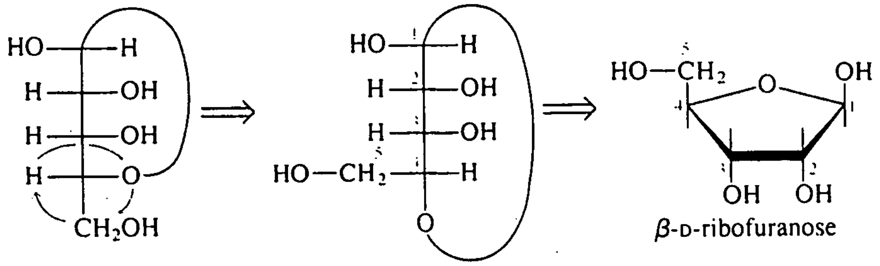
Haworth Projections A widely used convention for representing the cyclic forms of sugars is the **Haworth projection.** In this convention, the cyclic form of a sugar is represented as a *planar ring* at right angles to the page. This projection simply shows whether the groups on the ring are up or down without indicating a specific conformation. The Haworth projection is simple to draw from either of the corresponding chair forms, as we can see in the following representation of β-D-glucopyranose.



(27.6)

In the Haworth projection, the heavy, shaded lines of the ring are meant to be visualized in front of the page; the lighter lines are in back. The bonds with nothing on the ends bear hydrogen atoms. (Notice that this convention differs from the one used in ordinary skeletal formulas, in which such bonds represent methyl groups.)

Although cyclopentane rings are not planar, they are close enough to planarity that the Haworth projections for furanose sugars are good approximations to their actual structures. Haworth projections are frequently used to represent furanoses for this reason. The Haworth projections for furanoses can also be derived using the method shown in Fig. 27.2, except that a five-membered ring is formed instead. Thus, the Haworth projection for β-D-ribofuranose is derived as follows:



(27.7)

The Haworth formula is named after Sir Walter Norman Haworth (1883–1950), a noted British carbohydrate chemist who carried out important research on the cyclic structures of sugar derivatives. Haworth received the Nobel Prize in Chemistry in 1937 and was knighted in 1947.

2

Problems

3 Draw the Fischer projections, Haworth projections, and, for the pyranoses, the chair structures of each of the following compounds:

(a) β-D-mannopyranose (c) β-D-xylofuranose
(b) α-D-fructopyranose (d) α-L-glucopyranose

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